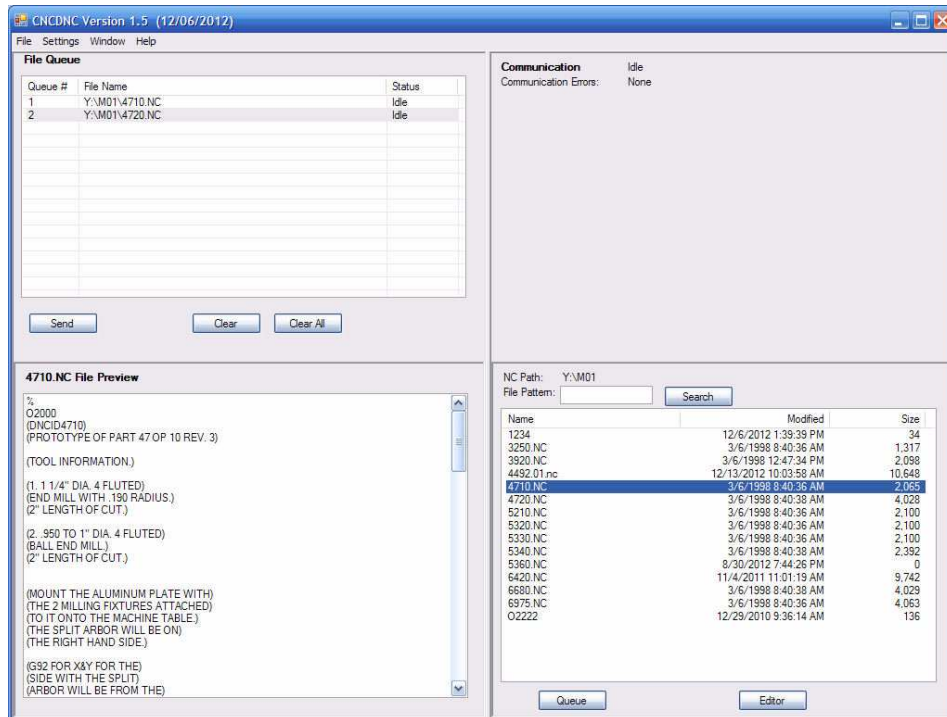


CNC*Dnc

User's Manual



Version 1.4 Release 2013

Innovation Driving Quality and Productivity

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Table of Contents

- License Agreement3
- CNC*Dnc Features4
- Installation.....5
- Licensing and Support.....6
- Technical Support7
- Configuration.....9
- CNC*Dnc Operations 11
- Receive File Operations 12
- Remote Program Request..... 14
- Typical Error Program Format 15
- Automated PDF View 16
- Technical Support 17
- Buffer Overflow Considerations..... 18
- Communications Troubleshooting 19
- Wiring and Cable.....21
 - SUGGESTED CABLE CONFIGURATION FOR SOFTWARE HANDSHAKING23
 - SUGGESTED CABLE CONFIGURATION FOR HARDWARE HANDSHAKING23
 - 9 TO 9 PIN WIRING.....24
 - 25 TO 9 PIN WIRING.....24
- ASCII Chart.....25
- About CNC Innovations.....26
- Index27

License Agreement

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CNC*Dnc Features

Features

- Queue multiple files for sequential or manually selected transfer.
- Initiate queued file transfer at the NC control.
- Automatically receive files into a pre-defined Upload/Revision folder.
- Allows incoming NC files to designate a user specified filename.
- Remotely request NC files from the DNC System via the NC Control.
- Automatically view PDF files associated with NC files.
- Preview contents of NC files selected for queue operation.
- Use your own, third-party, editor to view or edit NC program data.
- Fully configurable RS-232 parameters and flow control.

Installation

Preliminary Notes

The CNC*Dnc program will run on a Windows XP or Windows 7 (32 or 64 bit) platforms. On Windows XP the program settings are maintained in "Documents and Settings\All Users\Application Data\CNC Innovations, LLC\CNCDnc\1.4.0.0." Windows 7 will similarly store program settings in the ProgramData folder, which is by default a hidden folder on Windows 7.

During installation the above "Settings" storage location will be updated to include the "Everyone" group with appropriate privileges to allow standard Windows 7 users full program functionality. Aside from network restrictions, no separate permissions will be required after program installation.

To install the program run the CNCDNCInstaller.msi program located on the distribution CD. For convenience the installation program can be copied to a shared network drive.

Hardware Considerations

For proper and efficient operation CNC*Dnc significantly relies on the underlying RS232 port hardware. To achieve best results we recommend the use of native or card based RS232 devices. Additional options may include PCMCIA card adaptors, LAN to Serial hubs, wireless device servers, and lastly USB to serial adaptors. Keep in mind that not all manufacturers provide high quality hardware and device drivers. This is especially true when it comes to USB to Serial devices as evident by the range of pricing for these adaptors.

As it is impossible for CNC Innovations to test every possible device, we highly recommend that only industrial / commercial grade devices be used. Also, when selecting a particular device you should verify that the device and / or device driver is configurable to lower or disable the embedded port FIFO (Tx / Rx) buffers. See Buffer Overflow Considerations for more information. Keep in mind that even if a device appears to be configurable, it may not provide the necessary response required by your CNC control to avoid buffer overflow errors. For example, we have found that USB devices in the \$12 to \$25 range work poorly and may be prone to errors, where as devices costing \$100 or more work very well.

In general the best devices are card based ports, followed by hard-wired LAN to Serial hubs, and lastly wireless and USB devices. If your particular device appears to work improperly you might consider contacting the manufacturer for a firmware upgrade. In our testing, even among industrial providers, we have found several devices that required such upgrades before they would work correctly.

Licensing and Support

Licensing

The CNC*Dnc program is installed for an initial trial period of thirty days. To receive a full software license please contact your dealer or, if necessary, CNC Innovations with your displayed License Seed code as displayed in the License Activation section of the System menu. A full activation code will be provided upon full payment of the product. CNC Innovations suggests that end-users perform a full and complete program evaluation prior to purchase.

Important - To avoid load errors it is also important to note that CNC controls are sensitive to program/buffer overflow during input operations. Be sure that your PC hardware is configured to properly communicate with CNC equipment. See: Buffer Overflow Considerations



Technical Support

Eligibility

When you purchase CNC*Dnc from CNC Innovations, LLC., or one of its dealers you are eligible for free, product-specific, telephone technical support for a period of 30-Days from the date of purchase. Supplemental technical support is also available both on a pre-paid hourly basis and through the purchase of a comprehensive service agreement.

Scope

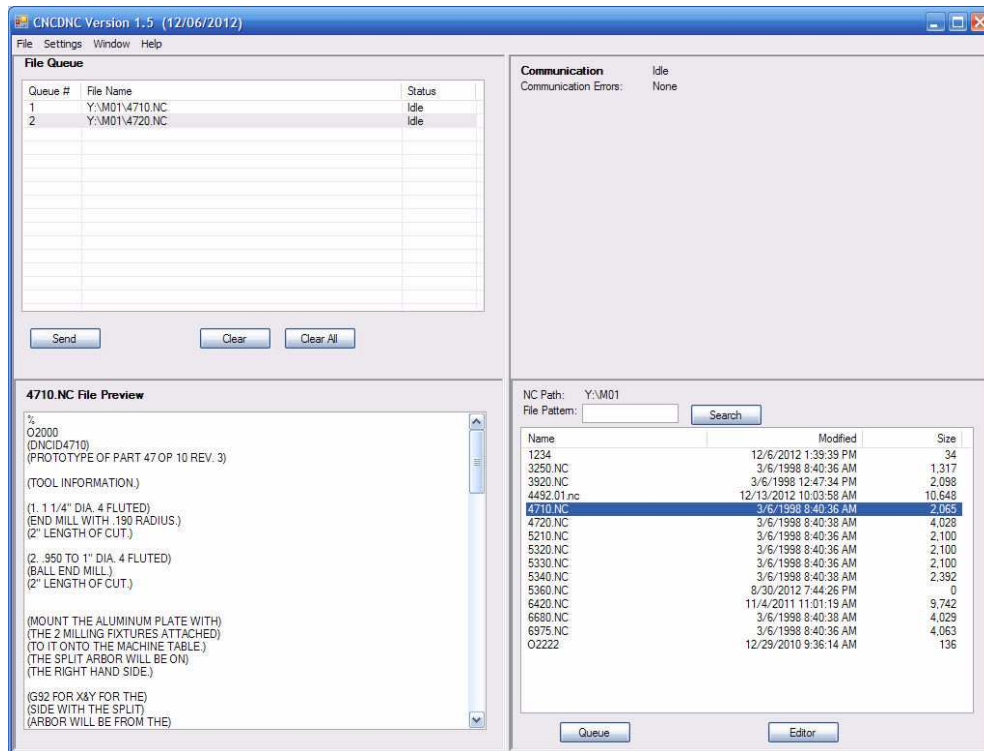
CNC*Dnc runs on Microsoft Windows XP and Windows 7 operating systems. It is therefore expected that you have a basic understanding of using the Windows operating system. It is also assumed that you know how to configure and use the communications options on your machine controls.

CNC Innovations and/or its dealers will be happy to answer any relevant questions you may have about CNC*Dnc, but we reserve the right to limit support to CNC*Dnc product only. If your situation goes beyond the application and functionality of the product, you may contract with us for supplemental technical support.

If CNC*Dnc was purchased through your dealer, be sure to contact them for initial support. If necessary you may be instructed to contact CNC Innovations directly.

Contact CNC Innovations Technical Support at: 508-523-1763.

Screen Layout and Operation



The main program screen allows the user to send and receive files to and from the NC Control. The program layout contains four quadrants. The top-left window lists the NC programs currently queued for transfer to the machine control. Queued programs are transferred on a first in, first out bases.

Manual selection and transfer is also possible by highlighting a program in the queue list. As programs are transferred they are removed from the queue list and the numbered order list is updated. To the right of each program is a Status indicator identifying the current state of program transfer. When a transfer is active, the top-right window will display program transfer activity.

The lower-right window displays program files available for transfer in your NC File Path folder (See System Configuration). When a program is highlighted, as shown above, a preview of the program contents is displayed in the left-hand window. Please note that only a preview is available; to see the entire program it is necessary to open the program in Editor view. The Editor command button is only available when an editor program has been specified in the System Configuration options.

Along the top of the display the main menu bar provides several options. Select the System menu to access License Activation or to Exit the program. The Settings menu provides system configuration options, and the Window menu allows resizing the main screen right/left grid separator to its default size. The Help menu provides Help as well as program revision information.

Configuration

The screenshot shows the 'Communications Port Setup' dialog box. It is split into two panes: 'Communication Parameters' and 'File Parameters'. The 'Communication Parameters' pane contains dropdown menus and spinners for COM Port # (2), BAUD Rate (9600), Parity (Even), Data Bits (7), Stop Bits (2), Handshaking (Xon/Xoff), Xon Char (17), and Xoff Char (19). The 'File Parameters' pane contains text boxes with browse buttons for Production NC File Path (Y:\NCfiles\M01), Recieve NC File Path (Y:\NCfiles\M01\Revision), and PDF File Path (Y:\NCfiles\M01\Documents). It also has spinners for EOB Character (10), Send File EOB Delay (0 msec), Rcv File Timeout (3 sec), and Remote Input Req. Char (17). There are two checked checkboxes: 'Direct In (P<Program Name>)' and 'Remote Request Option P<Program Name>'. Below these are text boxes for Remote Req. Program # (1111) and Remote Req. Err Program # (1234). At the bottom, there is a text box for NC Program Editor (C:\WINDOWS\notepad.exe). 'Save' and 'Cancel' buttons are located at the bottom left of the dialog.

The Settings menu will open the system and communications setup form.

*Note that the CNC*Dnc program will not run if there are no available RS232 communications ports available on your PC. It is also important to lower and/or disable your COMM Port's transmit and receive buffers. Failure to do so may result in Buffer Overflow alarms on your machine control. See: Buffer Overflow Considerations.*

Be sure to select an active system COMM port and then set the communications BAUD rate and parameters to match your machine control settings. In general, the settings shown above will work for most machine controls. The Xon and Xoff control characters represent the standard hex 11 and 13 flow control characters for Xon/Xoff flow-control handshaking. Additional handshaking options include RTS/CTS (hardware control), None, and K&T Protocol which works with Kearney and Trecker machines that require a start code echo before the machine will output.

In the File Parameters section three folder paths should be specified. The NC File Path and Receive NC File Path are required folders. It should be noted that for efficient operation when multiple PCs and machines are in use, each machine should be assigned a separate designated file path. As seen above, the folder M01 is a shared network folder specific to this machine.

Important - As stated above, the dedicated NC File Path, must contain a Receive NC File Path sub-folder--in this case named Revision--which is used to store all uploaded machine programs. An additional *optional*, PDF File Path folder, named Documents in our example, can be used for

related PDF program documents. See Automated PDF View for more information. In the absence of the Receive NC File Path folder the CNC*Dnc program will display a notification message upon startup.

The EOB character (end-of-block) will usually be set to line-feed (Dec. 10 / Hex 0A). In some cases this may be changed to Dec 13 / Hex 0D the carriage return character. An optional EOB delay can be used for older controls. The delay will slow the rate of transfer for each block of program data to accommodate older, slower controls.

The receive file timeout value is typically set between 3 and 5 seconds. This variable determines when CNC*Dnc will close and save a received program uploaded from the CNC control. In the above example, if a program is being uploaded from a control and there is a 3 second lapse in received data, then CNC*Dnc will automatically close and save the received program. Keep this value in mind when uploading several files at one time. Always allow sufficient time between each program upload to ensure that the programs are saved separately. This parameter is also important when implementing certain RS232 hardware devices, especially wireless devices which will often have latency considerations due to internal buffer operations. In such cases try extending the delay timeout to resolve premature file closing issues.

The Remote Input Req. Character will generally be set to the standard Xon character as shown. It is this character, when output from a machine control, that starts the transfer of a queued program.

If checked, the Direct In option allows the machine operator to specify a "save- as" file name when uploading programs. See Receive File Operations below.

Again, if checked, the Remote Request Option allows operators to upload a simple program request which will place the requested program in the file transfer queue. If the requested program is not found in the NC File Path, CNC*Dnc will look for and queue the Remote Req Err Program. The error program number specifies a particular and dedicated program to queue when a requested program is not found and works to notify the machine operator that the requested program was not found. Note that the error program must exist in the NC File Path and should be tested to comply with your specific machine NC program format.

CNC*Dnc Operations

Command buttons controlling CNC*Dnc system functions.

- **Search** - Use the file search option to quickly find a program located in the designated NC File Path folder. Search also doubles as a file filter to display only matching file attributes. For example, entering the number 54 will limit the display to only programs beginning with 54. For convenience the entered filter option is maintained between each program run.
- **Queue** - Adds a selected NC file to the Send File Queue. File listed in the queue are transferred to the NC control on a first in, first out bases. Programs may be manually transferred out sequence by highlighting a selection and clicking the Send button.
- **Editor** - Opens the highlighted NC program in the designated file editor. (See Configuration Settings). Note that the editor must be capable of accepting a command line argument. To test this feature use the Windows Run menu, simply drag and drop your editor shortcut in the Run command line followed by an NC file link. If the editor opens the program it will work CNC*Dnc.
- **Send** - Use this button to manually begin the transfer of the NC file currently highlighted in the Send File Queue. Be sure that the NC control is ready to accept program input.
- **Clear** - This will delete the highlighted entry in the Send File Queue.
- **Clear All** - This button will clear ALL entries from the Send File Queue.

Receive File Operations

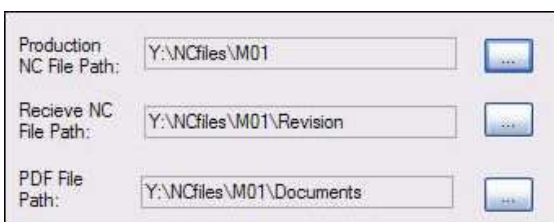
When a NC file is sent (uploaded) by the NC Control, the top-right Communication window displays the contents of NC file data being received. The user can Cancel the receive file operation by pressing the Cancel button found below the receive file window.



All received files are placed in the pre-defined NC File Path folder, which must be specified in the Configuration section. See Configuration Settings for details). All received files are automatically named using the format of: *<Computer Name.index number>* . The computer name is the Windows PC name as shown in the My Computer properties. The file extension is an index number starting with 001 that will increment as each new file is received.

For enhanced file saving and naming the machine operator can include a comment block using a format similar to the one shown the example below. Note that for this feature to work the Direct-In option must be *checked "On"* in the configuration settings.

With the addition of the comment block the file will be saved using the specified NC program name. For example, suppose that the Receive NC File Path has been designated as a shared network folder such as Y:\NCFiles\M01\Revision. Normally uploaded files will be saved in this folder using the default naming convention described earlier. However, if the naming comment block is used as shown below, the file will be saved in the folder with the file name 7777.02. Likewise, a format of (#P7777) will save the file as 7777 without a file or revision extension.



Configuration Settings

Example - File Save and Naming Control Block

```
O7777  
(#P7777.02)  
(REVISION FOR GEN TWO)  
. .  
M30  
%
```

The received program will be stored in the Receive NC File Path with the name 7777.02

Note that the # and P characters are required delimiters used to instruct CNC*Dnc to save the uploaded NC program with the name following these delimiting characters.

Important - It is important to note that multiple file uploads using the same naming block will *Overwrite* the existing file. Always verify that the designated name does not already exist when using the Direct-In file naming option.

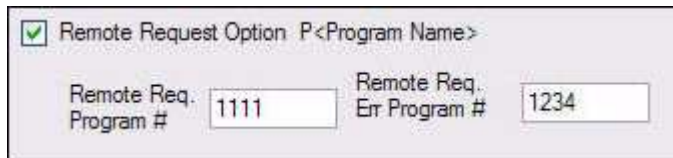
Remote Program Request

The CNC control can output a small "Request" file to instruct CNC*Dnc to place a specific NC program in the Send File Queue. This feature, if enabled, allows the PC to be placed in a remote location and still provide instant access to the NC programs. The request program number must conform to the format of the pre-defined Remote Request Program Number option (ex: 1111, see Configuration Settings for details). As shown, the request block contains the requested program, 7777.01

This sample program below demonstrates the format of a typical remote request. The program should remain resident on the control allowing easy operator editing of the program request line.

```
O1111    < - Program Number
P7777.01 < - Program Request preceded by "P"
M30
%
```

When CNC*Dnc receives the request program, and if the program file is found in the NC File Path, CNC*Dnc will queue the file in the File Queue. The operator can then initiate transfer of the queued file from the NC Control by performing standard Load operations.



The image shows a configuration dialog box with a title bar. Inside, there is a checked checkbox labeled "Remote Request Option P<Program Name>". Below this, there are two input fields. The first is labeled "Remote Req. Program #" and contains the value "1111". The second is labeled "Remote Req. Err Program #" and contains the value "1234".

Configuration Settings

Note: Although the Configuration settings for the Remote Request Program # allows only numeric characters, the CNC*Dnc program expects the uploaded request program to be preceded by either the "O" or ":" character as is typical with CNC controls. In fact, for proper operation the remote request program *Number* must be preceded by one of these characters. Also note that the "P" character is a required CNC*Dnc delimiter that must precede the NC program name or number.

If the requested program file does not exist, CNC*Dnc will queue the specified Remote Req. Err. Program--usually a dedicated program number. This program must exist in the NC File Path folder. Be sure to edit and test this program to conform with your control's program format and include sufficient comments to inform the operator that the requested file could not be found.

Typical Error Program Format

```
O1234  
(REQUESTED PROGRAM NOT FOUND)  
(VERIFY PROGRAM REQUEST PRECEDED BY P)  
(CONTACT PROGRAMMING IF NECESSARY)  
M30  
%
```

As a final note, this program should always be deleted from the control to avoid future "Program Exists" loading conflicts.

Automated PDF View

CNC*Dnc has an advanced feature to allow automatic viewing of PDF files after a manually or remote requested program is transferred to the CNC control. For this feature to work there must be a PDF file viewing program installed on the PC.

As mentioned in the Configuration section, if the NC File Path contains the optional Documents folder, CNC*Dnc will look in this folder for a PDF file matching the name of the transferred program. If the PDF is found it will be displayed upon completion of the NC program transfer.

Process Explanation - Assuming that program 7777.R1.NC has been queued and sent to the CNC control, CNC*Dnc will search for a PDF with a matching file name excluding the last extension. In this case the matching file name will be 7777.R1.PDF. The .NC extension has been replaced with the .PDF extension while the .R1 revision stamp remains intact. If the transferred program had been simply 7777 with no extensions, then CNC*Dnc would search for 7777.pdf.

Lastly, if the PDF file is not found in the Documents folder, CNC*Dnc will then search for and display the file named *default.pdf*. This file can be structured to display any useful information or simply a message indicating that a matching PDF is yet to be created.

Technical Support

Eligibility

When you purchase CNC*Dnc you are eligible for free, product-specific, telephone technical support for a period of 30-days from the date of purchase. Supplemental technical support is available both on a pre-paid hourly basis and through the purchase of our Comprehensive Service Agreement.

Scope

CNC*Dnc runs on Microsoft Windows XP and Windows 7. It is therefore expected that you have a basic understanding of using Windows based software. It is also assumed that you know how to configure and use the communications options on your machine controls.

CNC Innovations or its dealers will be happy to answer any relevant questions you may have about using the software, but we reserve the right to limit technical support to our product functionality only. For example, we will work with you to help you configure CNC*Dnc's communications parameters to match those of your machine control, but you must know the current settings on the control and/or how to change those settings.

If your situation goes beyond the application and functionality of our product, you may contract with CNC Innovations or its dealers for supplemental support.

Supplemental Technical Support

CNC Innovations, LLC and its dealers may provide hourly supplemental support for most machine communications problems. Support is available by telephone or on-site. To obtain technical support contact CNC Innovations, LLC. Technical Support at 508-523-1763.

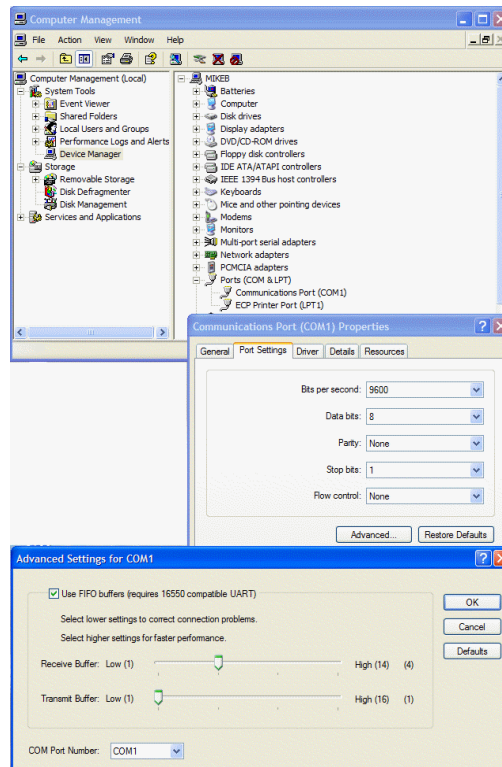
Buffer Overflow Considerations

When CNC*Dnc is configured to use the host computer's local serial ports (Comm 1 & 2) or with many USB, PCMCIA, Wireless, and Card based serial adaptors, it is important to adjust the "transmit" and "receive" buffers (FIFO) for the serial port hardware. Note that these buffers are not always available and at times may not actually work as described on low-cost hardware. If the default settings are not adjusted you may experience a buffer overflow problem while loading NC programs on older controls.

Resolving The Buffer Problem

To configure your serial port(s) use the following procedures.

- Right-Click the My Computer icon and select Manage
- Select Device Manager from the Computer Management page
- Expand the Ports (COM & LPT) section
- Double-click the COM Port to display its Properties
- Click Advanced on the Port Settings tab
- Set the both Buffer sliders to their lowest setting, typically 0 or 1 and then Uncheck the Use FIFO option.
- Reboot the PC



Communications Troubleshooting

NOTE: We will be happy to answer questions about configuring and using CNC*Dnc, but we can not offer free assistance in configuring the machine control or in using communications on the control. Extended technical support may be purchased for these issues on a pre-paid hourly basis.

For extended troubleshooting it is advisable to run CNC*Dnc from a laptop computer situated next to the machine control as this will save the time spent walking to and from a remote CNC*Dnc host PC. Before starting, be sure to configure the Communications Parameters to use the laptop's serial port.

Always start troubleshooting by sending from the machine control to CNC*Dnc. The CNC*Dnc software is much more flexible in how it receives data and will not issue an "alarm" as machine controls do. Also, the nature of the data received may help you identify the source of the problem.

Follow these steps if you are having a problem communicating with the machine control.

1. Send a program from the machine control to the PC.

If the machine "Alarms"

The cable may not be connected to the correct port at the machine control. Check the cable configuration at the machine end, particularly pins 6, 8, and 20.

If the machine acts like it is prepared to send but "sits" continuously in send mode

A file will not be sent if the CTS line (line 4 or 5 depending on the machine configuration) is not asserted. The cable should have a jumper between pins 4 & 5, or lines 4 and 5 should pass through to their compliment lines on the computer end.

If the machine looks like it is trying to send but you see nothing in the top-right file activity pane

Check the cable. Pins 2 and 3 may need to be swapped to match the send/receive lines on the machine control with the receive/send lines on the computer. If hardware handshaking is being used, and pins 2 and 3 need to be swapped, pins 4 and 5 will also need to be swapped.

Check to see that the correct machine COM port has been selected. A quick test is to unplug the cable while trying to send. If an alarm is shown, then the correct port is being addressed.

Check the CNC*Dnc communications parameters to be sure the correct PC COM port has been selected.

Try sending to CNC*Dnc from another machine control or another computer to verify the PC COM port is not defective.

If "garbage" characters are displayed in the top-right file activity pane of CNC*Dnc while receiving

The communications parameters are probably mismatched. Check to see that the communications BAUD rate and data parity (Odd, Even, None) match. Many machines have a parameter setting to select between EIA and ISO (Odd and Even respectively).

Other possible sources of "garbage" are long cables, cables with weak connections, cables running near EMF sources, or ground faults.

2. Once data has been successfully received, most cabling and machine parameters, as well as, COM port configuration problems will be eliminated.

Now send a known good program from CNC*Dnc to the machine control. A good method is to receive a program from the machine control, edit and change its program number, and then send it back to the control.

If CNC*Dnc appears to send the file but the machine acts like it is not receiving

Check the file contents again. Again, perform the initial tests with a file which has been received from the control, not one generated on your CAD/CAM system. Some controls require an end of block at the beginning of the file or require a program qualifier (like O2213) at the beginning of the file. Others require a M30, M02, %, or END at the end of the file. Refer to your programming manual for specific information.

If a partial program is received (blocks of data appear to be dropped), or the machine issues a data overflow alarm

Make certain that the computer's RS-232 ports are not configured to utilize their built-in FIFO buffers. This setting is accessed from the Windows Control Panel and is discussed in the Buffer Overflow Considerations section.

Check to make sure handshaking has been properly enabled. If the cable uses only lines 2, 3 and 7 select X-ON/X-OFF protocol. (Also referred to as software handshaking or DC1/DC3 control codes.) If the machine does not support software handshaking use a cable with pins 4 and 5 connected. This will enable CTS/RTS handshaking.

Wiring and Cable

RS-232 serial data transfer remains the single most popular means for communicating with modern CNC equipment. Although capable of high transfer rates, interference from Ground Loops, Radio Frequency (RFI), and Electro Magnetic Interference (EMI) can greatly impede the reliability and performance of any DNC system.

To minimize the possibility of data corruption, review the following guidelines when considering the installation of cable for your DNC system.

Ground Loops

Simply stated, a ground loop occurs when two devices do not share the same source of ground. And, since the ground signal sets a common frame of reference for data signals, a ground loop can inhibit all communication between the devices. Furthermore, if the potential difference between the two devices exceeds 30 volts, circuit damage is likely to occur.

By far, the best way to avoid ground loops is to make certain that all equipment, machines and computers alike, share the same ground source, and the best source is earth ground through the use of grounding rods. As for computer equipment and external port hardware, never eliminate or by-pass the third wire ground lug on the AC line cord.

Interference

Interference with RS232 data can be introduced in many ways. Fortunately, careful selection, routing, and placement of the transmission cable can eliminate the most common factors.

The following list outlines the major considerations for avoiding data corruption from interference:

- Make certain that all equipment is properly grounded.
- Computers and external hardware should be equipped with surge protection devices.
- Individual RS232 lines should be fitted with inexpensive surge filters.
- Select good quality cable that utilizes both a foil and braided shield.
- Follow the appropriate procedures for wiring diagrams, paying special attention to solder, shield, hood, and screw connections.
- Avoid excessively long cable runs.
- Avoid routing cable in the vicinity of EMI generating equipment, such as: wire EDMs, arc welders, plasma cutters, large motors, fluorescent lights, etc.
- Although rare, another potential source of sporadic problems is radio transmitters. This is especially true in the vicinity of Amateur or CB transceivers when cable lengths approach multiples of a quarter wavelength of the operating frequency.

Installation Considerations

1. Always label each end of the cables to provide easy identification.
2. Cable ends should be routed to provide free and easy access for connector assembly.
3. Take special care when routing in the vicinity of overhead cranes or other movable equipment.
4. External port hardware, such as LAN to Serial hubs, should have a secure mounting platform (typically 18" x 12") with easy access to an AC power source.

Resolving Problems

Independently verify that a CNC will indeed communicate via its RS232 port before assuming the DNC system is defective. When confronted with extremely long cable requirements, consider the use of single-port hubs, RS422 adapters or short haul modems.

Extremely problematic environments--especially those with ground loop difficulties arising from building to building communications--will benefit from optical isolators. These devices serve to protect equipment from electrical surges and preserve data integrity.

In areas of high intensity electrical fields, consider enclosing the cable within well-grounded electrical conduit.

Wiring Diagrams

We highly recommend the use of surge suppressors to reduce the potential for lightening and other surge damage to the machine controls. These may be obtained from CNC Innovations.

It is your responsibility to verify serial cable wiring requirements for the control. If in doubt, refer to a machine control dealer or a qualified service representative.

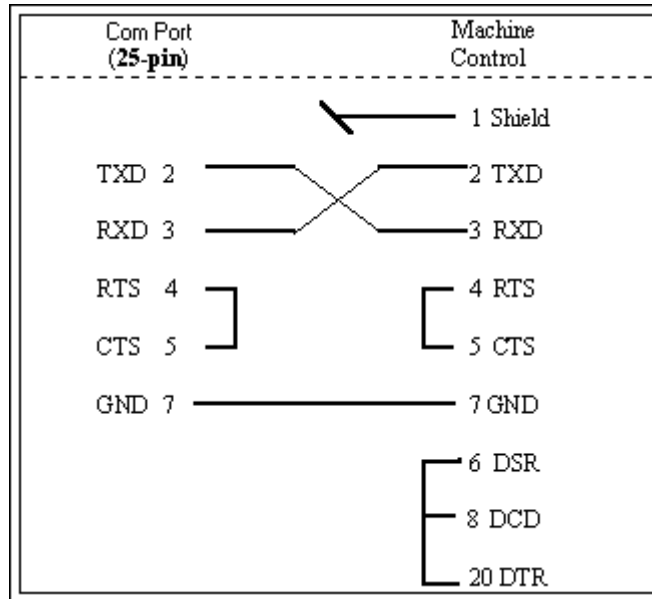
Please note that cable wiring and machine configuration requirements go beyond the specific range of our product, we can not offer free technical support for either of these configuration problems. Extended technical support may be purchased for these issues on a pre-paid hourly basis.

On the following pages are suggested cable configurations for common machine connections. If these configurations do not work, refer to your machine control manual for more information.

Contact your dealer or CNC Innovations to purchase ready made or custom length cables

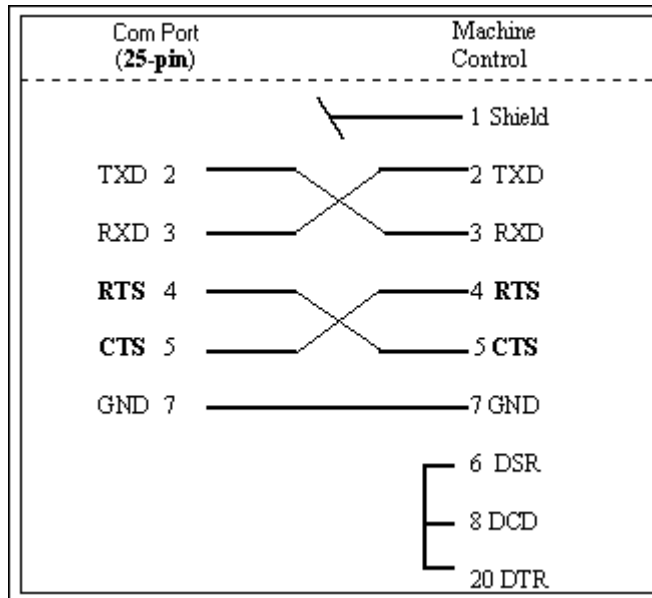
SUGGESTED CABLE CONFIGURATION FOR SOFTWARE HANDSHAKING

(Software may be referred to as Xon/Xoff or DC1/DC3)

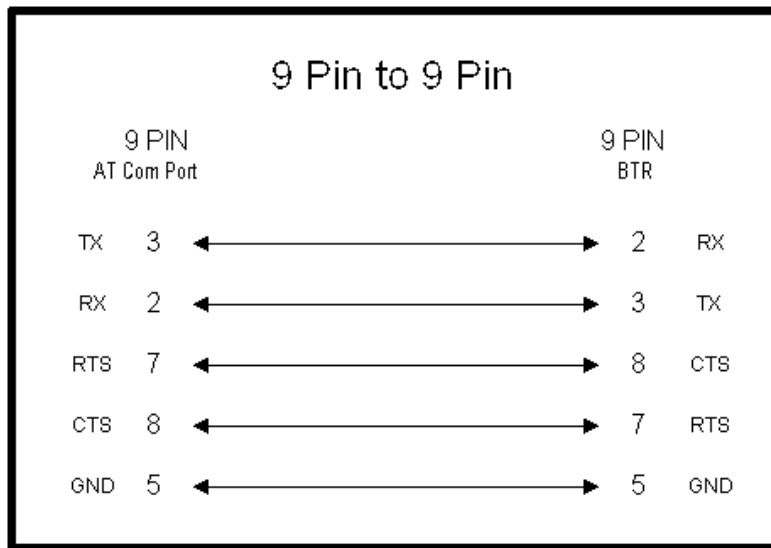


SUGGESTED CABLE CONFIGURATION FOR HARDWARE HANDSHAKING

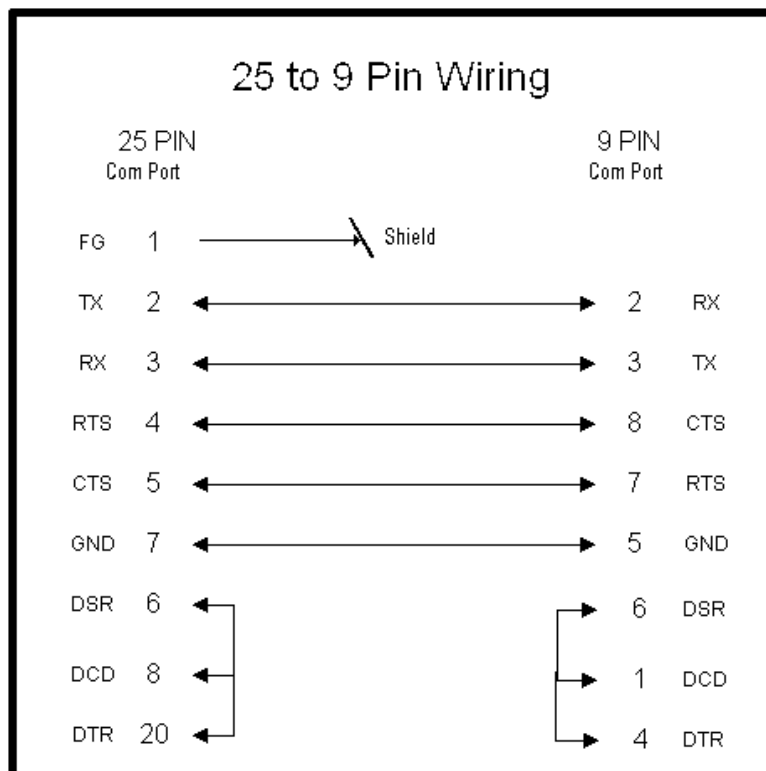
(Hardware may be referred to as CTS/RTS or Level 1)



9 TO 9 PIN WIRING



25 TO 9 PIN WIRING



ASCII Chart

CTRL	DEC	HEX	CHAR	CODE	DEC	HEX	CHAR	DEC	HEX	CHAR	DEC	HEX	CHAR
^@	0	00		NUL	32	20	!	64	40	@	96	60	`
^A	1	01	☐	SOH	33	21	!"	65	41	A	97	61	a
^B	2	02	☐	STX	34	22	!"#	66	42	B	98	62	b
^C	3	03	♥	ETX	35	23	!"#\$	67	43	C	99	63	c
^D	4	04	♦	EOT	36	24	!"#\$%	68	44	D	100	64	d
^E	5	05	♣	ENQ	37	25	!"#\$%&	69	45	E	101	65	e
^F	6	06	♠	ACK	38	26	!"#\$%&'	70	46	F	102	66	f
^G	7	07	•	BEL	39	27	!"#\$%&'(	71	47	G	103	67	g
^H	8	08	☐	BS	40	28	!"#\$%&'()	72	48	H	104	68	h
^I	9	09	○	HT	41	29	!"#\$%&'() *	73	49	I	105	69	i
^J	10	0A	☐	LF	42	2A	!"#\$%&'() * +	74	4A	J	106	6A	j
^K	11	0B	♂	VT	43	2B	!"#\$%&'() * + ,	75	4B	K	107	6B	k
^L	12	0C	♀	FF	44	2C	!"#\$%&'() * + , -	76	4C	L	108	6C	l
^M	13	0D	ƒ	CR	45	2D	!"#\$%&'() * + , - .	77	4D	M	109	6D	m
^N	14	0E	ƒ	SO	46	2E	!"#\$%&'() * + , - . /	78	4E	N	110	6E	n
^O	15	0F	*	SI	47	2F	!"#\$%&'() * + , - . / 0	79	4F	O	111	6F	o
^P	16	10	▶	DLE	48	30	!"#\$%&'() * + , - . / 0 1	80	50	P	112	70	p
^Q	17	11	▶	DC1	49	31	!"#\$%&'() * + , - . / 0 1 2	81	51	Q	113	71	q
^R	18	12	‡	DC2	50	32	!"#\$%&'() * + , - . / 0 1 2 3	82	52	R	114	72	r
^S	19	13	!!!	DC3	51	33	!"#\$%&'() * + , - . / 0 1 2 3 4	83	53	S	115	73	s
^T	20	14	¶	DC4	52	34	!"#\$%&'() * + , - . / 0 1 2 3 4 5	84	54	T	116	74	t
^U	21	15	§	NAK	53	35	!"#\$%&'() * + , - . / 0 1 2 3 4 5 6	85	55	U	117	75	u
^V	22	16	—	SYN	54	36	!"#\$%&'() * + , - . / 0 1 2 3 4 5 6 7	86	56	V	118	76	v
^W	23	17	±	ETB	55	37	!"#\$%&'() * + , - . / 0 1 2 3 4 5 6 7 8	87	57	W	119	77	w
^X	24	18	‡	CAN	56	38	!"#\$%&'() * + , - . / 0 1 2 3 4 5 6 7 8 9	88	58	X	120	78	x
^Y	25	19	↓	EM	57	39	!"#\$%&'() * + , - . / 0 1 2 3 4 5 6 7 8 9 :	89	59	Y	121	79	y
^Z	26	1A	→	SUB	58	3A	!"#\$%&'() * + , - . / 0 1 2 3 4 5 6 7 8 9 : ;	90	5A	Z	122	7A	z
^[	27	1B	←	ESC	59	3B	!"#\$%&'() * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; <	91	5B	[	123	7B	{
^\	28	1C	⌞	FS	60	3C	!"#\$%&'() * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < =	92	5C	\	124	7C	|
^]	29	1D	↕	GS	61	3D	!"#\$%&'() * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = >	93	5D	]	125	7D	}
^^	30	1E	▲	RS	62	3E	!"#\$%&'() * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ?	94	5E	^	126	7E	~
^_	31	1F	▼	US	63	3F		95	5F	_	127	7F	DEL

DEC	HEX	CHAR	DEC	HEX	CHAR	DEC	HEX	CHAR	DEC	HEX	CHAR
128	80	€	160	AO	á	192	CO	Ł	224	EO	α
129	81	ú	161	A1	í	193	C1	ł	225	E1	β
130	82	ê	162	A2	ô	194	C2	ŧ	226	E2	Γ
131	83	ã	163	A3	ú	195	C3	†	227	E3	π
132	84	ä	164	A4	ÿ	196	C4	—	228	E4	Σ
133	85	å	165	A5	ÿ	197	C5	†	229	E5	σ
134	86	å	166	A6	ª	198	C6	†	230	E6	μ
135	87	ç	167	A7	º	199	C7	‡	231	E7	γ
136	88	è	168	A8	¿	200	C8	‡	232	E8	æ
137	89	é	169	A9	ƒ	201	C9	‡	233	E9	θ
138	8A	è	170	AA	¬	202	CA	‡	234	EA	ϑ
139	8B	ì	171	AB	½	203	CB	‡	235	EB	δ
140	8C	ï	172	AC	¼	204	CC	‡	236	EC	∞
141	8D	ì	173	AD	ı	205	CD	—	237	ED	∅
142	8E	ñ	174	AE	«	206	CE	‡	238	EE	€
143	8F	ñ	175	AF	»	207	CF	‡	239	EF	π
144	90	é	176	BO	»	208	DO	‡	240	FO	≡
145	91	«	177	B1	»	209	D1	‡	241	F1	ı
146	92	œ	178	B2	»	210	D2	‡	242	F2	λ
147	93	ø	179	B3	ı	211	D3	‡	243	F3	ζ
148	94	ö	180	B4	ı	212	D4	‡	244	F4	Γ
149	95	ö	181	B5	ı	213	D5	‡	245	F5	J
150	96	ù	182	B6	ı	214	D6	‡	246	F6	÷
151	97	ù	183	B7	ı	215	D7	‡	247	F7	≈
152	98	ÿ	184	B8	ı	216	D8	‡	248	F8	°
153	99	ÿ	185	B9	ı	217	D9	‡	249	F9	·
154	9A	U	186	BA	ı	218	DA	‡	250	FA	·
155	9B	φ	187	BB	ı	219	DB	‡	251	FB	√
156	9C	£	188	BC	ı	220	DC	‡	252	FC	°
157	9D	¥	189	BD	ı	221	DD	‡	253	FD	z
158	9E	¥	190	BE	ı	222	DE	‡	254	FE	·
159	9F	f	191	BF	ı	223	DF	‡	255	FF	

About CNC Innovations

CNC Innovations started in 1988 as a software division of CNC Engineering, Inc. At that time CNC Engineering sold and supported several third-party hardware solutions for DNC connectivity. As the installation engineers gained experience it became apparent that customers were looking for more innovative and cost-effective solutions. As a result, in 1991 CNC Engineering established CNC Innovations as a separate software company dedicated to developing, marketing, and supporting a totally independent line of manufacturing software.

CNC Innovations' early products focused on using emerging laptop PCs for DNC communications and file management. The goal in using PCs was to provide flexible and cost effective solutions that were no longer dependent on proprietary hardware. As a result, Easytalk, was the first PC based DNC product developed. Easytalk was well received by the marketplace and quickly became an industry standard and set the stage for the development of subsequent product ideas. Coupled with refreshing product innovation and unsurpassed customer support, CNC Innovations quickly evolved to become one of the dominant players in the DNC marketplace.

In 2006 CNC Innovations separated from CNC Engineering and is now located in central New England. From its headquarters in Auburn, Massachusetts, it is able to provide a quicker and more dedicated response to customers.

We sincerely hope you enjoy the power and simplicity of CNC*Dnc.

Visit our website at www.cncinnov.com

Our Products:

Focal*Point DNC

Machine Event Monitoring

Behind the Reader (BTRs)

Tape-to-Disk Conversions

Easytalk Shell DNC

Assembly and Inspection Tracker

Custom RS-322 Cables

Custom Software Solutions

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Index

A

ASCII Chart, 28

C

CNC*Dnc Features, 5
Communications Parameters, 22
Communications Troubleshooting, 22
Comprehensive Service Agreement, 19
CTS/RTS, 22

D

DC1/DC3, 22
Disclaimer of Warranty and Limited Liability,
4
DNC System, 5

E

Editor, 9

F

FIFO, 22

H

Help, 9
Help menu, 9

L

License Activation, 7, 9
License Seed, 7

N

NC File Path, 9
lists, 9

O

Operation, 9

P

PDF, 5
PDF File Path, 11

R

Receive NC File Path, 11
Remote Req Err Program,
11
Remote Request Option, 11
Resizing, 9
RS232, 5, 11
RS-232, 22

S

Screen Layout, 9
Select
System menu, 9
Settings menu, 9
Software Handshaking, 24
Suggested Cable
Configuration, 24
Hardware Handshaking,
24
Software Handshaking, 24
Supplemental Technical
Support, 19
System Configuration, 9

T

Technical Support, 19

U

Upload/Revision, 5

W

Wiring, 24
Diagrams, 24

X

X-ON/X-OFF, 22